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consist exclusively of "plugs driven with great force into the mouths of the pores of the cell wall where they open upon the surface of the space occupied by the solution." But how were these "plugs" to be driven into place with such force that no pressure can displace them? The solution of this problem was the electrolytic method of depositing semi-permeable membranes which was devised by Professor Morse, and which is now the only method in use for the building up of osmotic membranes.

It was necessary, however, in order that deposition occur in exactly the right positions, namely, just within the inner mouths of the pores, to secure a texture of porous cell wall of a hitherto unknown degree of fineness. The requisite degree of uniformity and fineness of texture of porous cell wall was finally obtained, after four years of experimental work with clays from many sources. After developing to a high degree of precision all phases of the method, the formal measurement of osmotic pressure was begun. The most striking conclusions to be drawn from the results to date are: (1) that the magnitude of osmotic pressure in aqueous solutions depends on the *numerical ratio* of the solute to the solvent molecules; (2) that the laws of Boyle and Gay-Lussac for gases hold good for the osmotic pressure of solutions, but in a different sense from that supposed by Van't Hoff. According to Van't Hoff, and most others, a gram-molecular weight of a substance dissolved in water and diluted to a liter volume should, at zero degrees, exert an osmotic pressure of 22.26 atmospheres, the same pressure which an equal quantity of gas exerts at the same temperature when its volume is reduced to one liter. This is not true. It is true that if a gram-molecular weight of a substance is dissolved in 1,000 grams of water at zero degrees, and no hydration occurs to change the numerical ratio of solute to solvent molecules, the osmotic pressure of the solution will be found to be

22.26 atmospheres and at any higher temperature it will be what the law of Gay-Lussac would require.

### SCIENTIFIC ITEMS

WE record with regret the death of Dr. Lucien Ira Blake, formerly professor of physics and electrical engineering at the University of Kansas; of Dr. James William White, emeritus professor of surgery in the University of Pennsylvania, and a trustee of the university; of Dr. William Frederick King, chief astronomer of the Canadian government; of Professor F. Schenck, the director of the physiological institute at Marburg, and of M. Octave Lignier, professor of botany at the University of Caen.

MEMBERS of the National Academy of Sciences have been elected, as follows: Gregory Paul Baxter, professor of chemistry, Harvard University; Gilbert Ames Bliss, professor of mathematics, University of Chicago; Marston Taylor Bogert, professor of organic chemistry, Columbia University; Otto Folin, professor of biological chemistry, Harvard Medical School; Leland Ossian Howard, chief of the Bureau of Entomology, U. S. Department of Agriculture; Phoebus Aaron Theodore Levene, member in biological chemistry, Rockefeller Institute; Alfred Goldsborough Mayer, director of the department of marine biology, Carnegie Institution; Raymond Pearl, head of the department of biology, Maine Agricultural Experiment Station; Frank Schlesinger, director of the Allegheny Observatory, University of Pittsburgh.

THE Royal Society has elected as foreign members: Prince Boris Galitzin, head of the Russian Meteorological Service; Dr. C. L. A. Laveran, of Paris, discoverer of the malarial parasite; Dr. Johan Hjort, director of Norwegian Fisheries; Professor Jules Bordet, the bacteriologist of the University of Brussels, and Professor H. Kamerlingh-Onnes, professor of physics at Leyden.